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CASE REPORT

A nonconventional approach to prevent mouth dryness in a patient with a complex maxillofacial defect

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ABSTRACT

This report describes prosthetic rehabilitation of a patient with dry mouth due to a complex maxillofacial defect. The patient had undergone 5 surgical operations because of repeated recurrence pleomorphic adenoma, which resulted in partial maxillectomy followed by total maxillectomy, and finally orbital resection. The patient was left with oral, nasal, and orbital communication. Rehabilitation with a silicone facial cover was planned because the patient's chief complaint was mouth dryness during sleep, and air leakage through the defects was considered a cause of this dryness. Furthermore, the patient was reluctant to use a conventional prosthesis for the time being. A silicone facial cover was fabricated. The patient's speech and sleep quality were evaluated after the treatment, and the patient's oral dryness was found to improve with use of the cover. Use of a silicone facial cover instead of a conventional prosthesis gave a satisfactory result and is one option for preventing mouth dryness in a patient with multiple facial defects. (*Int J Maxillofac Prosthetics 2020;3:7-11*)

INTRODUCTION

Facial defects may be caused by surgical treatment of facial or maxillary tumors, maxillofacial injuries, or congenital malformations.[1] Restoration of facial defects can be accomplished surgically, prosthetically, or with a combination of both treatments.[2] Functional and esthetic rehabilitation is often attained postsurgically by prosthetic rehabilitation using extraoral facial prostheses when reconstructive surgery cannot be performed because of psychophysical factors or extensive tissue loss.[3, 4]

Patients with maxillofacial defects often deal with severe functional problems related to mastication, deglutition, and speech.[5] In addition, altered salivary secretion resulting in dry mouth is a postsurgical complication that can affect quality of life. Patients with a maxillofacial defect often have multiple contributing factors for dry mouth, including resection of the salivary gland, radiotherapy, and long-term use of multiple medications.[6] Evaporation at the maxillofacial defect site may also promote dry mouth[7] because of air passing through the defect between the oral and nasal cavities and/or out of the face through the facial defect. Symptomatic management, including oral moisturizers or saliva substitutes, is one solution to dry mouth.[8] From a prosthodontic perspective, prosthetic rehabilitation may also be needed to restore effective separation between the oronasal and facial defects and achieve functional improvement. Silicone facial prostheses have been proposed as the best approach to rehabilitating patients with craniofacial defects because of their soft tissue–like texture and appearance.[9,10] In this clinical report we describe rehabilitation with a silicone facial cover, which was chosen because the patient's chief complaint was dry mouth that affected her sleep and she was reluctant to wear a conventional prosthesis.

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CASE REPORT

In 2010, a 48-year-old female patient was referred to our maxillofacial prosthetics department from the head and neck surgery department for prosthetic treatment. The patient had pleomorphic adenoma of the left hard palate and had 3 tumor recurrences through 2017, requiring 5 surgical operations. As a result, she had a large defect in the maxilla that extended to the orbit. The defect had been covered using a skin graft but there were perforations in the orbital and temporal areas. The oral cavity was connected to the exterior of the face through the nasal cavity and facial defects even when the mouth was closed. All teeth except the upper right third molar were missing. A total of 3 surgical obturators and 2 definitive obturators were made from 2011 through 2016. In 2017, the patient had a surgical operation that caused 2 typical defects in the orbit and the temporal bone area (Fig. 1). Her chief complaint was dryness of the mouth. At this time, she was still undergoing chemotherapy and radiotherapy treatment, even though the condition of the remaining tumor was unstable. An intraoral view of the maxillary defect is shown in Fig. 2, illustrating the difficulties for prosthetic treatment because of the large skin graft: less supportive bone, and lack of teeth for retention. There was dryness of the lips and facial skin, with pooling of saliva under and around the tongue; no redness of the oral mucosa was noted. The patient had both nasal and oral breathing but had no difficulty swallowing, no changes in the sense of taste, and no burning sensation in the mouth. She usually covered the facial defect with gauze.

The options given to the patient were 1. fabrication of a dento-maxillary prosthesis, 2. fabrication of a simple obturator prosthesis without artificial teeth, 3. use of artificial saliva, 4. fabrication of a facial prosthesis, and 5. fabrication of a simple covering for the face. These options were discussed with the patient. She stated her reluctance to use prostheses for the time being but noted that she only felt discomfort during sleep because of dry mouth. So the plans making intraoral prostheses were rejected because she declined the fabrication of obturators. We observed that the reason for the dry mouth was air leakage from the oral defect to the exterior and not because of lack of saliva. Thus, we opted not to use the artificial saliva. The patient preferred to have a covering for the facial defect but not a facial prosthesis with an artificial eye and extrinsic coloration for the esthetic reasons because she was still receiving treatment for the tumor and had no plans for any social activity. Thus, the treatment plan was established to involve rehabilitation using a simple facial covering.

A sheet of paraffin wax (Paraffin Wax, GC Corp, Tokyo, Japan) was heated and placed over the defect, following the patient's facial contour. The margin of the wax pattern was adjusted using soft plate wax (Soft Plate Wax, GC Corp, Tokyo, Japan) (Fig. 3). The wax pattern was embedded in hard plaster (New Fujirock, GC Corp, Tokyo, Japan) with an extended edge of 2–5 cm. The wax pattern was replaced with silicone material (Vinyl Polysiloxane Soft Lining Material, GC Silfy, GC Corp, Tokyo, Japan) using conventional processes. The cover was fitted on the patient and adjusted. The completed facial cover is shown in Fig. 4. The patient was advised to use the facial cover during sleep, and to use silicone adhesive (Daro Adhesive Extra Strength, Factor II Inc., Lakeside, AZ) to affix the cover to her face. It was confirmed that the cover remained in place even when the patient faced downward.

Fig 1. Patient's facial appearance after the fifth surgical resection.

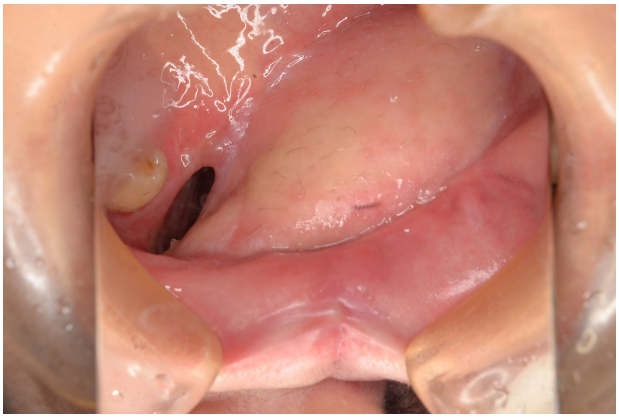

Fig 2. Intraoral view of the maxillary defect.

After the treatment, speech evaluation was performed using digital acoustic analysis of vowel formant frequency (Computerized Speech Lab CSL4500, KayPentax, Lincoln Park, NJ).[11] Sleep quality was also assessed using the Japanese version of the Pittsburgh Sleep Quality Index, which comprises a 19-item self-report questionnaire yielding 7 component scores: subjective sleep quality, sleep latency, duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction.[12] Sleep efficiency was calculated as (hours slept / hours in bed) × 100%.

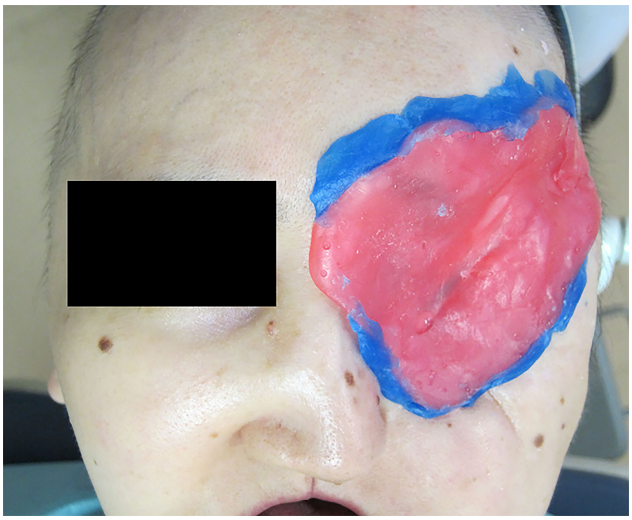

Fig 3. Chairside wax-up and relining.

At 1 month after delivery of the facial cover, the patient stated that her mouth dryness was improved and that she felt more comfortable when using a mesh cap instead of silicone adhesive to secure the facial cover. She had no difficulty falling asleep and had no sleep disturbance due to dry mouth. She could wear, remove, and clean the facial cover by herself. Figure 5 shows a comparison of the patient's vowel F2 frequencies under 3 conditions: with the silicone facial cover in place, with gauze in place, and without the cover in place. Her global Pittsburgh Sleep Quality Index score was 3, indicating that she had acceptable sleep quality and sufficient sleep duration over a 1-month period. Sleep efficiency was 87.5%. The patient has used the silicone facial cover for a year as of this writing.

DISCUSSION

This report describes prosthetic rehabilitation with a facial cover for mouth dryness. Oral moisturizers or saliva substitutes are a treatment option for dry mouth that is due mainly to resection of the salivary glands combined with radiotherapy. In this case, however, rehabilitation with a silicone facial cover reduced mouth dryness without the use of artificial saliva. The treatment was effective possibly because the facial covering could close the communication of the oral/nasal cavity to the exterior, thereby preventing air-leakage from those cavities directly to the exterior of the face.

Common materials typically used for facial prostheses are acrylic resin and silicone. Acrylic resin is sometimes used because of its convenience in terms of adjustment, relining, and repair. However, it lacks flexibility, adaptability to adjacent soft tissue, with poor strength of the thin edge. Therefore, in this case, silicon material was used to fabricate the facial cover, and this resulted in a flexible, tear-resistant, smooth, and clean covering.

The communication of the oral cavity with the exterior of the face also created a change in resonance

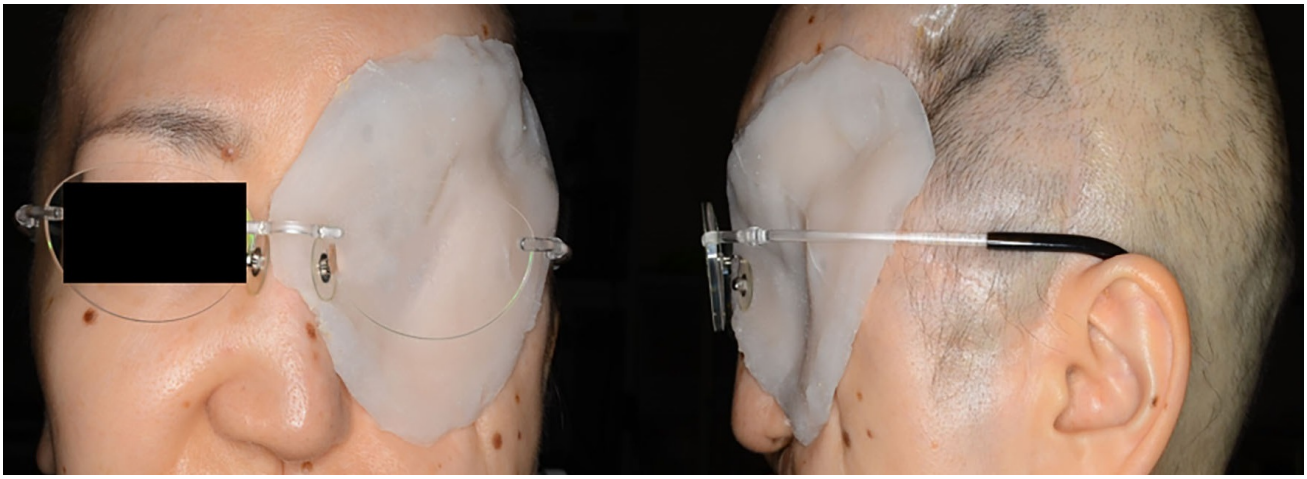

Fig 4. Completed silicone facial cover.

because it altered the shape of the vocal tract. Sumita et al[13] reported the use of acoustic analysis of the F2 range for assessing speech ability in maxillectomy patients, because these patients have difficulty in precisely controlling F2. Evaluation of resonance using digital acoustic analysis of formant frequency for the 5 vowels showed that while the F2 range was increased when the patient was wearing gauze, the range was further increased with the facial cover in place. The F2 range of the patient was significantly larger when the face cover was used and the value was comparable to our previous study.[14] Acoustic evaluation indicated that the patient had good speech performance, and air leakage through the nasal cavity and orbit to the oral cavity was decreased when she was using the facial cover compared with gauze. This is because the gauze did not completely cover the defect, and because air was able to pass through the mesh surface of the gauze.

Sleep evaluation results showed that use of the silicone facial cover also resulted in relatively good sleep quality, and suggested that the patient's main reason for awakening had changed because her mouth dryness was alleviated. Similar to speech ability, it is likely that sleep quality was improved with the silicone cover because of its impermeability and adaptability compared with gauze. However, as this evaluation occurred only 1 month after treatment, a longer follow-up is necessary to fully assess sleep quality.

In most cases, the primary objective of prosthetic rehabilitation in patients with maxillofacial defects is restoration of function and appearance. However, the criteria for successful facial prosthetic treatment are multifaceted, and the most suitable treatment option is not always clear. It is also important for the prosthodontist to understand the patient's desire for flexibility in choice of treatment. In the present case, covering the defect to prevent air leakage was identified as a primary goal. A facial cover also has the potential to serve as pre-treatment before delivery of the definitive facial prosthesis, thereby giving the patient an idea of how the final prosthesis would look and function. This would allow to become accustomed to the silicone material and may be particularly beneficial for older patients who have difficulty adapting to change.

Even after the three-month observation period following the fabrication of the prosthesis, further follow-up is needed. In this case, dry mouth was diagnosed based on patient interview and clinical examination only. Objective examination of the amount and quality of saliva and measurement of the salivary flow rate will be investigated in a future study.

CONCLUSION

A silicone facial cover was an effective treatment option for preventing mouth dryness in a patient with multiple facial defects.

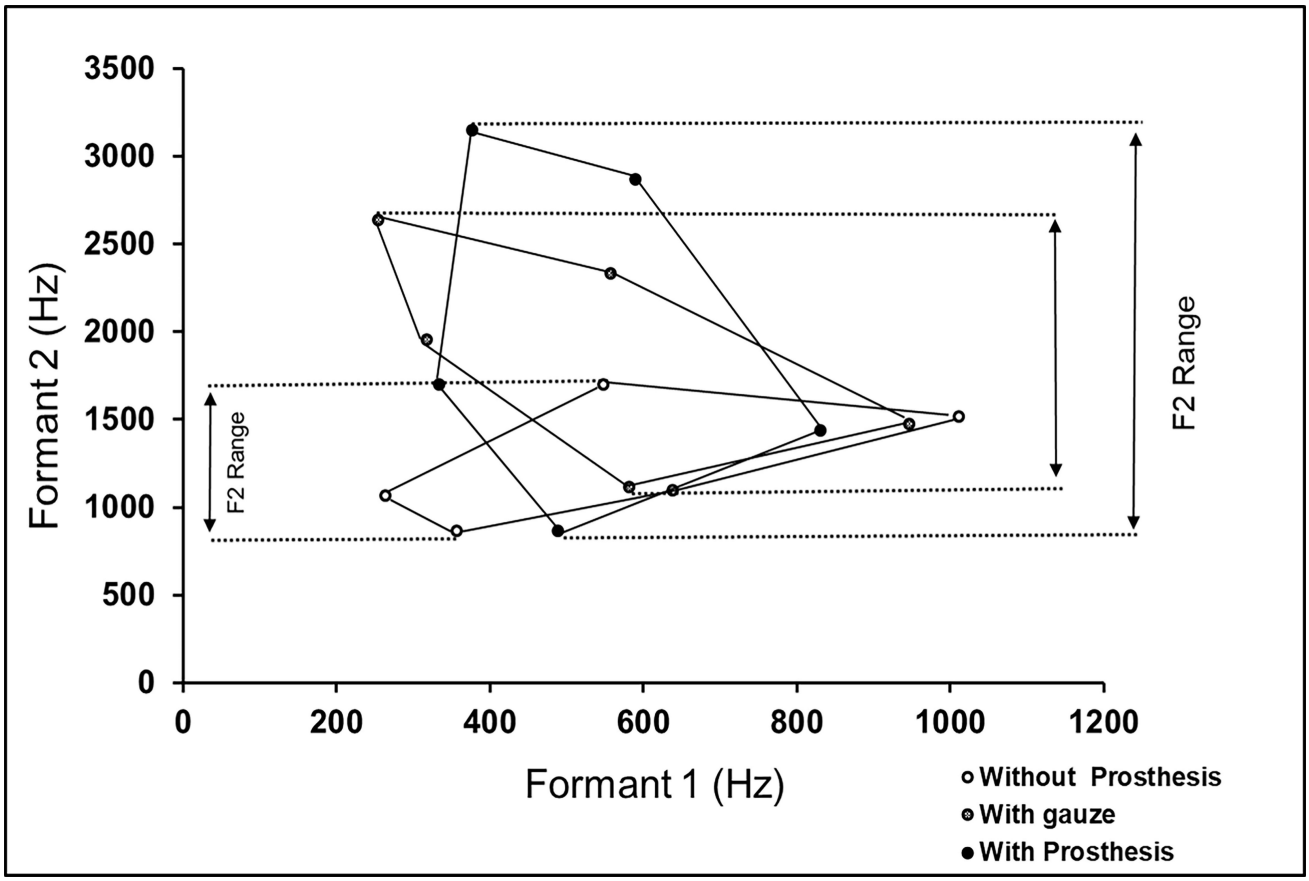

Fig 5. Comparison of formant 2 frequencies.

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